CLAIMS

1. A method of protecting a semiconductor device, comprising the steps of:

providing a DC power source, a load, and a semiconductor device arranged between the DC power source and the load;

providing a circuit element connected to the semiconductor device;

switching the semiconductor device so that the load is changed between a driving state and a stopping state;

cutting off a conduction of the semiconductor device between the DC power source and the load when a voltage drop across the semiconductor device exceeds a predetermined reference voltage; and

setting a constant of the circuit element so that the reference voltage is not greater than a critical voltage,

wherein the critical voltage is a product of an on-resistance of the semiconductor device when its channel temperature is at an upper limit of the permissible temperature, and a minimum current value which causes the channel temperature to reach the upper limit of the permissible temperature by the self-heating due to Joule heat.

2. The method as set forth in claim 1, wherein when there are changes in the on-resistance for the specification of the semiconductor device, the minimum value among the changes of the on-resistance is employed.

3. A protection apparatus for a semiconductor device comprising:

a DC power source;

a load;

a semiconductor device, arranged between the DC power source and the load, and changes the load between a driving state and a stopping state;

a circuit element, connected to the semiconductor device;

a comparator, comparing a voltage drop across the semiconductor device with a predetermined reference voltage; and

a cut off section, cutting a conduction of the semiconductor device between the DC power source and the load when the voltage drop is greater than the predetermined reference voltage,

wherein a constant of the circuit element is set so that the reference voltage is not greater than a critical voltage; and

wherein the critical voltage is a product of the on-resistance of the semiconductor device when its channel temperature is at an upper limit of the permissible temperature, and a minimum current value which causes the channel temperature to reach the upper limit of the permissible temperature by the self-heating due to Joule heat.

4. The protection apparatus as set forth in claim 3, wherein when there are changes in the on-resistance for the specification of the semiconductor device, the minimum value among the changes of the on-resistance is employed.